DOCUMENT RESUME

ED 140 016 CE 011 201

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TITLE Applicability of the SIGI Occupational Data Base to NTID's Curriculum Research and Career Counseling Needs.
INSTITUTION National Technical Inst. for the Deaf, Rochester, N. Y.
SPONS AGENCY Department of Health, Education, and Welfare, Washington, D.C.
PUB DATE Sep 76
NOTE 24p.; Report prepared by the Dept. of Career Opportunities, Nat'l. Technical Inst. for the Deaf

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Career Planning; Computer Oriented Programs; *Curriculum Development; *Deaf; Deaf Education; *Information Needs; Information Systems; *Occupational Guidance; Occupational Information; Post Secondary Education; *Program Effectiveness; *Vocational Counseling; Vocational Education
IDENTIFIERS Educational Testing Service; National Technical Institute for the Deaf; *System of Interactive Guidance and Information

ABSTRACT

The National Technical Institute for the Deaf (NTID) established a committee to study the applicability of SIGI's (System of Interactive Guidance and Information) occupational data base to NTID's curriculum research and career counseling needs. (SIGI is an Educational Testing Service--ETS--system which applies computer technology to assist hearing clients in the career decisionmaking process.) To evaluate SIGI's potential usefulness to NTID, answers to the following questions were sought: What sources and methods are used within SIGI to obtain occupational information? How often, and in what way, is this data base updated? Does SIGI portray more information than is currently available through standard sources? Is SIGI an effective means of collating current labor market information? To answer these questions, ETS literature on SIGI was reviewed, ETS personnel concerned with the SIGI occupational data base were questioned, and local directors of a nationally dispersed set of SIGI field demonstration sites were contacted by telephone. Because of the low percentage of occupations in SIGI that related to NTID training programs, and since the SIGI data base did not seem to add to the prepared career counselor's arsenal of occupational information, it was recommended that plans for application of the data base to the NTID program should not be pursued. (SH)

APPLICABILITY OF THE SIGI OCCUPATIONAL DATA BASE TO NTID'S CURRICULUM RESEARCH AND CAREER COUNSELING NEEDS

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September, 1976

This report was completed in the course of an agreement between the National Technical Institute for the Deaf (NTID) and the Department of Health, Education, and Welfare (DHEW), but does not necessarily represent the official opinions or policies of DHEW or NTID.

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Employment conditions among deaf persons have been chronically depressed (see: Lunde & Bigman, 1959, and Crammatte, 1968). Severe underemployment, with the majority of participation restricted to the "secondary" labor force, has greatly reduced the lifetime earnings potential of deaf persons (Weinrich, 1972). These conditions, and others not mentioned, have deprived deaf persons from full participation in the American experience. To counteract these problems, the National Technical Institute for the Deaf (NTID) was established by Public Law 89-36 to provide a "residential facility for the post-secondary technical training and education for persons who are deaf, in order to prepare them for successful employment."[1]

The NTID Policies, Guidelines, and Application Procedures (U.S. Department of Health, Education & Welfare, 1966) specified that "the Institute will create the opportunity for more deaf persons to engage in satisfying occupations that are consistent with the student's aspirations and ability and the requirements of society" (p. 3). To assist in accomplishing this directive, the Guidelines further mandated the Institute to provide "an effective and continuing student guidance, evaluation, and counseling program" (p. 9).

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[1]Public Law 89-36, 89th Congress, H.R. 7031, June 8, 1965, Sec. 2.

When fully operational, the yearly NTID enrollment will total 750 full time students. Typically, these students arrive at NTID with an average reading level of 8th grade (Walter, 1974) and with a narrow frame of reference that is probably the result of restricted educational inputs (see: "Schools and Classes", 1972). With the combination of an educationally handicapped clientele, a short time of matriculation (averaging 2 1/2 years), and limitations on the quantity of available professional manpower, NTID must seek to provide new and innovative methods of delivering career counseling services to its student body.

Improved career counseling services could assist NTID students in making rational and informed career decisions that lead to successful employment. Educational Testing Service's (ETS) System of Interactive Guidance and Information (SIGI) (1974) may have the potential to facilitate this career decision-making process. SIGI was designed to apply computer technology to assist clients in examining their values toward work, to explore career options, to interpret relevant occupational data, to formulate tentative career plans, as well as to modify these plans based on fresh insights, new experiences, and added information.

But, because SIGI was developed to be implemented with hearing clients in junior colleges and community colleges, an NTID committee was established to study SIGI's feasibility for improving the quality of NTID students' career decisions. The purpose of this report is to present the outcomes of one component of this committee's study -- the

applicability of SIGI's occupational data base to NTID's curriculum research and career counseling needs. Other components of this committee's study include investigations into SIGI's: language level and cognitive requirements; career counseling impacts; interface with RIT/NTID hardware; curriculum impacts; and cost-effectiveness.

The SIGI occupational data base provides the grist from which clients grind out tentative career decisions as they progress through SIGI subsystems summarized in Table 1. Occupational data provided include information on work activities, entry requirements, income, personal satisfactions available through work, conditions of work, and employment outlook for the occupations listed in Appendix 1. As indicated in Appendix 1, 12% (20/155) of these occupations correspond to 86% (20/23) of the current NTID training programs; 16% (26/155) of those occupations correspond to 50% (26/51) of RIT curricula.

Briefly, as a result of this investigation of the SIGI occupational data base, we recommend that other components of the NTID SIGI Committee study be carefully consulted in conjunction with this study before a decision on the adoption of SIGI is reached. In addition, application of the SIGI data base to the information needs evident in the CPM does not seem to be worth pursuing.

The remainder of this report is organized into the following three major sections: study design, findings, and implications for decision-making. A list of references cited and two appendices supplement this report.

TABLE 1

Summary of Occupational Data Base Applications Categorized by SIGI Subsystem

SUBSYSTEM	WHAT THE STUDENT DOES	QUESTIONS ANSWERED
Introduction	Learns concepts and uses of major sections listed below.	Where do you stand now in your career decision-making? What help do you need?
I. VALUES	Examines 10 occupational values and weighs importance of each one.	What satisfactions do you want in an occupation? What are you willing to give up?
II. LOCATE	Puts in specifications on 5 values at a time and gets lists of occupations that meet specifications.	Where can you find what you want? What occupations should you look into?
III. COMPARE	Asks pointed questions and gets specific information about occupations of interest.	What would you like to know about occupations that you are considering? Should you reduce your list?
IV. PREDICTION	Finds out probabilities of getting various marks in key courses of preparatory programs for occupations.	Can you make the grade? What are your chances of success in preparing for each occupation you are considering?
V PLANNING	Gets displays of program for entering each occupation, lists of colleges in region offering suitable majors, and sources of financial aid.	How do you get from here to there? What steps do you take to enter an occupation you are considering?
VI. STRATEGY	Evaluates occupations in terms of the rewards they offer and the risks of trying to enter them.	Which occupation fits your values best? How do you decide between an occupation that is highly desirable but risky and one that is less desirable but easier to prepare for?

Source: Educational Testing Service (1974)

Design of SIGI Occupational Data Base Study

Making rational career decisions requires individuals to: (a) possess a clear knowledge of their work-related skills and needs; (b) understand the skill requirements and potential need satisfiers of various occupations; and (c) make career choices consistent with (a) and (b). This conception of the career decision-making process, evident as early as Parson's Choosing a Vocation (1909), provides SIGI's raison d'etre as well as its subject matter. Within this framework, the provision of accurate occupational information is one element critical to SIGI's usefulness for improving the career decision-making skills of NTID students. To evaluate the potential usefulness of the occupational information provided by SIGI, answers to the following questions were sought:

- What sources and methods are used within SIGI to obtain information about work activities, occupational entry requirements, income, personal satisfactions, conditions of work, and general employment outlook?
- How often, and in what way, is this data base updated?
- Does SIGI portray more information than is currently available through standard sources such as the Bureau of Labor Statistics?

In addition, other benefits to NTID may be realized through the application of SIGI's occupational data base to NTID curriculum research problems. The NTID Policies, Guidelines, and Application Procedures (U.S. Department of Health, Education & Welfare, 1966) stated that NTID

technical training must be offered in occupational areas which reflect current and expected national human resource needs and which provide opportunities for successful employment of deaf persons. NTID has developed a planning mechanism, called the Curriculum Process Model (CPM), to realize these responsibilities. SIGI's applicability as a generator of quality labor market information for use in the CPM was investigated, particularly:

- Is SIGI an effective and efficient means of collating information for use in element II.A of the Need/Justification Phase of the CPM?

To answer these questions, available ETS literature on SIGI was reviewed, but this literature provided no more than a superficial description of the development, implementation, and evaluation of SIGI's occupational data base. Therefore, travel to ETS was conducted to pointedly and intensively question ETS personnel who have direct responsibility for the integrity of SIGI's occupational data base (see Appendix 2 for interview schedule). This questioning, as well as telephone contacts with local directors of a nationally-dispersed set of SIGI field demonstration sites, adequately supplemented ETS' marketing-oriented SIGI descriptions.

In the next section of this report, information gathered from published ETS literature and ETS personnel and field demonstration director interviews was synthesized to provide answers to the four major questions posed in this study.

Findings of the Study

In this section, detailed responses are provided for each of the four questions of interest in this study of the SIGI occupational data base.

Sources and Methods for Obtaining Occupational Information

According to Chapman (1975):

> SIGI's occupational data comes from more sources than we have space to list, and it is as accurate as we can make it with the help of specialists in many fields -- including national sources such as the Bureau of Labor Statistics and various other bureaus of the federal government, professional organizations, labor unions, occupational briefs and monographs; a similar variety of regional and local sources, including many State agencies; plus a miscellany of sociological and psychological studies of occupations, college handbooks, assorted publications, and a wealth of cooperative and informed people in the various occupations.
>
> Data from different sources sometimes failed to agree. We searched into such discrepancies very carefully. For example, when data were derived from different surveys, we evaluated sampling procedures and response rates, and made some judgment about the trustworthiness of each source. Although SIGI emphasizes national rather than local occupational information, we checked national data against representative regional and local data, and often incorporated regional differences when they were significant.
>
> Documentation for all the information is on file in our office library, and is continually brought up to date, with changes edited into the computer periodically. (pp. 18-19)

This type of "loose" documentation, tinged by appeal to authority rather than evidence, is repeated elsewhere in SIGI literature (see, e.g.: Educational Testing Services, 1975a; Katz, 1974). And, although field demonstration site SIGI users have rated its quality highly (Educational Testing Services, 1975)[2], little published detail on the SIGI occupational data base is evident.

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[2]Also in our telephone conversations with field demonstration site directors, Dr. R. Wheless (Sante Fe Community College, Gainesville, Florida) and Mr. Ernest Newman (Pasadena City College, Pasadena, California).

For the purposes of this report, the question of the usefulness of SIGI occupational data sources and methods had to be answered, for the most part, during the course of an intensive interview with Ms. L. Pears and Ms. A. Weber, ETS personnel who, at the time, were charged with managing the SIGI occupational data base. These personnel were queried not only about sources and methods of obtaining occupational information, but also were asked to point to specific instances in which this information had improved the SIGI data base. ETS answers to these queries are organized around the following occupational information categories portrayed within SIGI: work activities, entry requirements, income, personal satisfactions available through work, conditions of work, and employment outlook.

Work activities. This is information on what workers do on the job and how they do it. Although these activities are typical of the occupation, duties are likely to vary by employer and size of employing organizations, geographic location, and other factors. In some occupations, individual workers specialize in certain tasks. In others, they perform the entire range of work in the occupation. Of course, work activities change as technology advances, new industrial processes are developed, and products or services change.

As is the case for most SIGI occupational information, information on the work activities in occupations assessed by SIGI is abstracted from the Occupational Outlook Handbook (Bureau of Labor Statistics, 1970).

In addition, SIGI personnel claim that descriptive pamphlets from professional organizations and/or unions (as appropriate) are also consulted and that Occupational Outlook Handbook (OOH) information is corroborated with these sources.

Occupational entry requirements. This is a listing of the ways a worker can qualify for entry into an occupation. Training for entry level jobs can be formal or informal, and, sometimes, occupational licensure is required.

Although the OOH is the primary reference for information on occupational entry requirements which are input to SIGI, appropriate professional organizations and/or unions supplement this source as necessary. For example, information from the National Association of State Directors of Special Education revealed to SIGI planners that, due to the highly specialized nature of most baccalaureate degree programs in special education, a graduate degree in special education is thought to be desirable, though not necessary, for entry level jobs in special education. Previously, graduate degrees were considered prerequisites in this area.

Income. In contrast to most of the information in the SIGI occupational data base, ETS planners feel that information from OOH on level and range of occupational income is inadequate. This would be particularly true near the end of the two year cycle during which an edition of the OOH is current. SIGI planners claim to obtain information from surveys

conducted by national organizations (usually for professional/technical occupations) and from union/employer contractual agreements published periodically by the Bureau of Labor Statistics.

Personal satisfactions available through work. An important aspect of an individual's choice of a career is the extent to which an occupation satisfies the individual's work-related needs. Occupational characteristics portrayed in SIGI as potential need satisfiers are: high income, prestige, independence, helping others, security, variety, leadership, opportunity to work in a personally satisfying occupational area, leisure, and early occupational entry. With the exception of high income and prestige,[3] the OOH is the major source of this information, although SIGI planners claimed that this information is corroborated with information from occupational briefs and monographs secured from a number of sources.

According to SIGI planners, seemingly conflicting information is often available on personal satisfactions available through work. For example, dancers may work seasonally, thus affording considerable leisure time. However, when working, dancers labor long hours, thus affording very little leisure time. To portray a consistent picture to clients, information on personal satisfactions is equalized over occupations by converting data to reflect full-time employment over a year. In the case of dancers, while employment would be described as seasonal, leisure time would be characterized as minimal.

[3] The source of income data was previously described in this report. Prestige data is obtained from Siegel (1971), which has become widely accepted as a measure of occupational prestige.

Conditions of work. The focus of this body of information is on potential employment limitations or work dissatisfiers. Some work conditions of interest are: extent of overtime and shift work, environmental conditions surrounding work, potential hazards, and physical demands. Also, regional differences in the demand for labor in the occupations referenced by SIGI are presented here. For example, a high concentration of demand for bookbinders in the Northeast might help to limit a client's employment expectations, thereby injecting a sense of realism in the process of career choice.

Again, the OOH is the primary source for SIGI information concerning the conditions of work, although SIGI planners emphasized that other information sources include occupational monographs and "expert" contacts.

Employment outlook. This includes information about the supply and demand for labor (regionally disaggregated, where deemed necessary) in occupations which can be accessed through SIGI. Bureau of Labor Statistics long-range forecasts provide the majority of these data. However, SIGI planners claimed that short-term forecasts are usually obtained from professional organizations. Note, however, that professional organizations have a vested interest in limiting entry into the occupations they represent; this, sometimes, is the source of discrepancies between information presented by independent data collection organizations.[4]

[4] As was the case in a recent discrepancy between National Science Foundation and Department of Labor statistics on the demand for Ph.D's.

The possibility exists for injecting disaggregated employment outlook information into SIGI (e.g., employment outlook for deaf persons in occupation "x"). These data, however, must be provided by the school requesting the localized data base, with full responsibility for data quality assumed by the requesting school. At least one field demonstration site has conducted this type of disaggregation with encouraging results.[5]

Frequency and Nature of Data Base Update

A complete review of the SIGI occupational data base is anticipated every two or three years according to SIGI planners. But, income data will be updated yearly in the Fall. Obviously, because SIGI occupational information depends heavily upon input from the OOH, SIGI updates can be expected to lag the two year OOH update cycle.

"Value Added" by SIGI Data Base

An important element in the determination of the usefulness of the SIGI occupational data base is the assessment of the extent to which it could add to the effectiveness of a career counselor already armed with the OOH as well as with the telephone numbers of professional organizations and several occupational "experts."

The OOH is the primary source of SIGI information. This seems rational because the Bureau of Labor Statistics, corporate author of the OOH, is powered by a stable of skilled labor economists who can call upon

[5]Telephone conversation with Mr. Ernest Newman (Pasadena City College, Pasadena, California).

considerable resources in their search for occupational information. It is likely that OOH personnel are probably aware of most major developments in many occupations.

The planners of SIGI's occupational data base were asked to point to instances in which occupational information was obtained from sources other than the Bureau of Labor Statistics. Their remarks are grouped into the following three categories: federal agencies other than the Bureau of Labor Statistics; unions; and occupationally-related publications.

Federal agencies. Examples of agencies contacted and resulting information obtained by SIGI planners follow:

Agency	Information
Federal Aviation Administration	aviation occupations information
Department of Agriculture	agricultural occupations information
Civil Service Commission	information on occupations in government agencies
Department of Interior	park service and recreation occupations information

Unions. Union contacts used to enrich OOH data included salary information from New York City Local 1199 of the Hospital Workers Union and from examination of a contractual agreement between United Airlines and their aircraft mechanics.

Occupationally-related publications. Using, as an example, the analysis undertaken for accounting occupations, the following information sources were consulted:

New York Labor and Industrial Relations publications;

California Occupational Guide (for definition and description of accounting occupations);

A community college course catalog (for typical accounting occupations coursework requirements);

Federal Civil Service publications.

The Fate of NTID Curriculum Research Spin-offs From SIGI

In addition to its primary career counseling purposes, SIGI holds the potential for impacting curriculum evaluation efforts. The SIGI occupational data base could be particularly useful in answering questions about whether the employment outlook for an occupation is sufficiently bright to warrant the development, or continuation, of a training program leading to entry into the occupation. The NTID CPM, particularly element II.A of the Need/Justification Phase, was developed to address these curriculum planning and maintenance issues. Use of labor market data to answer curriculum planning and maintenance questions has been assigned to the Employment Outlook Research Program administered by NTID's Occupational Research Section.

Unfortunately, SIGI does not contain any occupational information currently beyond the reach of occupational research personnel. This is especially true because SIGI planners conduct only secondary analysis of existing labor market data -- the same general methodology used in the Employment Outlook Research Program -- and do not have any plans to

conduct primary collections of data on labor supply, labor demand, and other potentially useful program planning information.

Implications for Decision-Making

Summary

The SIGI occupational data base includes information on the work activities, entry requirements, income, personal satisfactions, conditions of work, and employment outlook for 155 occupations, 12% (20/155) of which correspond to 86% (20/23) NTID training programs. Sixteen percent (25/155) of these occupations correspond to 50% (26/51) of RIT curricula. This information, for the most part, is gleaned by SIGI planners from the Occupational Outlook Handbook, although supplementary and corroborating information is sought from, among others, federal agencies, unions, professional organizations, and occupationally-related literature. An update of SIGI occupational information is planned for at least every three years.

Conclusions

1. The SIGI occupational data base appears to be a quality summary of some of the most accurate occupational information available.
2. SIGI planners seem to make reasonable attempts to incorporate information from a wide range of data sources into the occupational data base.
3. SIGI planners promise that their SIGI occupational data base will receive timely updating, given the publication cycles of its information sources.

4. The SIGI occupational data base seems to provide little additional information to the prepared career counselor.

5. The SIGI occupational data base would probably add little perceptible increment to the labor market information already available to NTID occupational research personnel for the conduct of the NTID Employment Outlook Research Program.

Recommendations

1. Although the SIGI occupational data base appears to be of high quality,
   and because it does not seem to add to the prepared career counselor's arsenal of occupational information,
   and because of the percentage of occupations in SIGI related to NTID training programs,
   reports of other components of the NTID SIGI Committee study (particularly, career counseling impacts and cost-effectiveness components) must be consulted before the potential contribution of SIGI to NTID's mission can be completely assessed.

2. Plans for application of the SIGI occupational data base to the NTID Employment Outlook Research Program should not be pursued.

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Appendices

1. Occupations Referenced by SIGI.

2. Schedule for Interview of ETS Personnel.

1. Occupations Referenced by SIGI

(* - RIT related)
(x - NTID related)

*Accountant
Actor/Actress
*Actuary
Advertising Copywriter
Aerospace Engineer
Aircond., Refrig., & Heating Mechanic
Aircraft Mechanic
Appliance Repair Tech.
*Architect
xArchitectural Tech.
Automobile Mechanic
Automobile Salesworker
Avionics Technician
*Bank Officer
Bank Teller
Beautician
xBookkeeper
Botanist
Broadcast Technician
xBusiness Mach. Repair Tech.
Chef/Cook
*Chemical Engineer
*Chemist
*Civil Engineer
Clergy
Clothing Designer
*Commercial Artist
xComputer Operator
*Computer Programmer
xConstruction Inspector
Correction Officer
Dancer/Dancing Teacher
Dental Assistant
Dental Hygienist
Dentist
Diesel Mechanic
*Dietitian
xDraftsman
Economist
EEK Technologist
*Electrical Engineer
xElectronics Technician
xEngineering Technician
Farmer
*Fine Artist/Private Art Teacher
Firefighter
Flight Attendant
Flight Engineer
Florist
*Food Scientist/Technologist
Forester
Funeral Director
Geographer
Geologist
Home Economist
Hospital Administrator
Hotel-Motel Manager
*Industrial Designer
Industrial Engineer
*Industrial Traffic Mgr.
xInstrument Repair Tech.
Insurance Agent
Interior Decorator
Interpreter/Translator
xKeypunch Operator
Labor Relations Spec.
Landscape Architect
Lawyer
Legal Assistant
Librarian
Library Technician
xMachinist
Manufacturer's Salesworker
Market Researcher
*Mathematician
*Mechanical Engineer
xMedical Lab. Tech.

xMedical Record Admin
*Medical Technologist
Meteorologist
Model
Musician
Newspaper Reporter
Nurse, Practical
Nurse, Registered
Nurseryman/Landscaper
Nursing Assistant
Occupational Therapist
Oceanographer
Operating Room Technician
xOptician
Optometrist
Personnel Interviewer
Pharmacist
*Photographer
Physical Therapist
Physician
xPhysician's Assistant
*Physicist
Pilot
Plumber
Police Officer
Political Scientist
*Production Manager
Psychologist
Public Health Specialist
Public Relations Worker
Purchasing Agent
Radio/TV Announcer
Radio/TV Service Technician
Real Estate Agent
Receptionist
Recreation Worker
*xRehabilitation Counselor
Respiratory Therapist
*Retail Store Manager
*School Counselor
xScience Lab. Technician
xSecretary
Securities Broker
Singer & Singing Teacher
xSocial Service Aide
*Social Worker
Soil Conservationist
Speech Path/Audiologist
Statistician
xStenographer
Surveyor
*Systems Analyst
Teacher Aide
Teacher, Art
Teacher, Biology
Teacher, Business
Teacher, Early Childhood
Teacher, Elementary School
Teacher, English/Lang. Arts
Teacher, Foreign Language
Teacher, History
Teacher, Indus. Arts
Teacher, Mathematics
Teacher, Phys. Education
Teacher, Phys. Science
Teacher, Special Education
Teacher, Voc/Tech
Technical Writer
Telephone Craftsworker
Television Producer/Director
Tool and Die Maker
xTypist
Urban Planner
Veterinarian
Wastewater Treat. Operator
Welder
X-Ray Technologist
Zoologist
xGeneral Studies

2. Schedule for Interview of ETS Personnel

prepared by
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1. What data sources and methods are used to provide information about work activities?
2. What data sources and methods are used to provide information about entry requirements?
3. What data sources and methods are used to provide information about income?
4. What data sources and methods are used to provide information about personal satisfaction?
5. What data sources and methods are used to provide information about conditions of work in various occupations?
6. What data sources and methods are used to provide information about employment outlook?
7. We are particularly interested in this aspect of the SIGI occupational data base as this data could be important for our planning concerns. Therefore, regarding occupational outlook information, do you take into account any other data besides supply and demand? If so, what kind of information and how is it incorporated?
8. Specifically, from what other bureaus of the federal government besides the Bureau of Labor Statistics do you obtain occupational information? Please indicate an instance when you have used such information.
9. What specific labor union data do you obtain? Please indicate an instance where this has been used.

10. What various occupational briefs and monographs have been used? Please indicate an instance where information from these sources has been incorporated.

11. Please explain to what extent data sources beyond those above mentioned are used and how they are used. Could you provide some examples?

12. Please explain how regional differences are taken into account in the SIGI occupational data base.

13. How often is the SIGI occupational data base updated? How is this accomplished?